Title: Add It Up In Number Ville! Adding 2-Digit Numbers With and Without Regrouping.

Brief Overview:

This lesson introduces students to the skill of adding 2-digit numbers, first without regrouping, and then with regrouping. Students will explore the place value of numbers, the traditional addition strategy and alternative algorithms for adding 2-digit numbers. Students will be able to decide to use regrouping to add 2-digit numbers as well as learn to use mental math and estimation to add 2-digit numbers.

NCTM Content Standard/National Science Education Standard.

Numbers and Operations:

- Use multiple models to develop initial understandings of place value and the base-ten number system.
- Develop and use strategies for whole-number computations, with a focus on addition.
- Use a variety of methods and tools to compute, including objects, mental computation, estimation, paper and pencil, and calculators.
- Apply and adapt a variety of appropriate strategies to solve problems.

NCTM Process Standards

Reasoning and Proof:

- Use various levels and types of reasoning including formulating proofs, patterns, conjectures, and rules.

Communication:

- Understand vocabulary, organization of process, and communicate and comprehend mathematical concepts and justifications with accuracy.

Connections:

- Relate mathematics to real life situations and other subject areas and make connections from one mathematical idea to another.

Representation:

- Represent mathematical ideas using concrete objects, pictures, and symbols.

Grade Level: Grades 2 to 3

Duration/Length: This lesson will take 3 days to complete during a regular 50 minutes a lesson period.

Maryland VSC

Standard 6.0 Knowledge of Number Relationships and Computation/Arithmetic

C. Number Computation

1. Analyze number relations and compute

a) Add numbers using a variety of strategies

- **Assessment limit**: Use no more than 3 addends, with no more than 3 digits in each addend and whole numbers (0 – 1000)

Student Outcomes:

At the end of the lessons, students will be able to:

- Use mental math strategies to add
- Follow steps in order to add 2-digit numbers without regrouping.
- Decide when to regroup to add 2-digit numbers
- Understand the value of each number in both vertical and horizontal forms for the purpose of adding them.

Materials and Resources

Students' Materials/Resources:

Lesson 1:

- Student Resources 1-3
- Base ten blocks, tens and Ones
- Number cubes
- Writing Materials (pencil, eraser and papers)
- Bundles of drinking straws arranged in tens and ones

Students' Materials/Resources

Lesson 2:

- Student Resources 3-4
- 2-Digit number cards
- Base ten blocks
- Tens and ones models
- Writing materials (Pencil, eraser and paper)
- Optional: Internet resources:
  www.scholastic.com/mathunt,
  http://www.enchantedlearning.com
  www.dositey, www.rainforest.com
  www.educationplace.com

Students' Materials/Resources

Lesson 3:

- Student Resources 5-9
- Writing materials (pencil, eraser and paper)

Teachers' Resources:

Lesson 1:

- *Ninety Nine Pockets* by Jean Myrick
- Overhead projector
- Teacher Resources1 and 2
- Lesson transparencies (Student Resources 1 and 2)
- Index cards with 2-digit numbers
- Overhead projector markers
- Bulletin board for the week titled, "The High Fence in Number Ville".
- Crayons
- 1 Brown bag per group of 4 students
- 12 paper clips for each brown bag
- 12 pre cut fish cards per bag (Teacher Resource 2)
- 12 strings per bag
- 100 Numbers chart for each student

Lesson 2

- *Fifty Four* Grand*mas and a Llama* by Lynn Manuel
- *Dinosaurs Everywhere* by Sarah Curran
- Overhead projector
- Teacher Resource 3
- Lesson transparencies (Teacher Resource 3, Student Resource 2)
- Index cards with 2-digit numbers
- Overhead projector markers
- Stickers

Lesson 3:

- Overhead Projector
- Teacher Resources 4-7
- Overhead projector markers
- Optional: Stickers

Development /Procedures:
Teacher Preparation

- Make photocopies of all Student Resource Sheets.
- Create fish cards: Cut each fish resource sheet to make 12 fish cards. (You may want to laminate the fish cards for future use.) Make a hole-punch, and attach a string through the hole. Attach a paper clip at the end of the string for students to pull with.
- Cut drinking straws into 1cm sizes for ones and 1decimeter sizes for the tens.

Lesson 1

Pre-Assessment (5 minutes)

- Provide students with hundred chart (Student Resource 1).
- Question: Why is this called a hundreds chart?
- Identify some 2-digit numbers, and ask students to name the numbers.
- Allow students to choose any five 2-digit numbers and shade them in any color of their choice.
- Ask volunteers to share their choices with the rest of the class, and shade them in on the overhead hundred chart.

Launch (10 minutes)

Fishing in Number Ville (Math Game)

- Drop the12 fish cards into the brown bag (Teacher Resource 1).
- Group students in pairs.
- Have students "fish" by pulling out cards on strings from the bag.
- Ask each pair of students to identify the numbers that are two 2-digits and explain why they are called 2-digit numbers. If they pick numbers other than 2-digit numbers, they must put the numbers back in the bag. Students should be able to explain why they put back numbers that are not 2-digit numbers.
- Conduct an oral quiz to ensure that all the students understand what 2-digit numbers are.

Teacher Facilitation: (20 minutes)

- Introduce key vocabulary words: **regroup, sum** and **addend.**
- Distribute base ten blocks and Place Value Mats to students (Student Resource 2).
- Model 2-digit addition without regrouping using base ten blocks on the overhead Place Value Mat.
  - Example: **22+34=<u>56</u>.** Remind students that they must always add the ones first, before adding numbers in the tens column.
    - Say, "When I am adding, I add the ones first. In this problem 2 + 4 = 6 and I will write the 6 in the ones column.
    - "Now I will add the tens. How many are in the tens place? (wait time—call on a student) Yes, 5. 2 tens and 3 tens are 5 tens."
- Assign 2-digit problems without regrouping for students to complete using their Place Value Mats.
- Model 2-Digit addition and place numbers under tens and ones columns.
- Assess students' progress by observing their work and offer assistance if needed.

Student Application:

- Complete Student Resource 3, "High Rises In Number Ville". Answer key can be found on Teacher Resource 2.

Embedded Assessment

- Observe and make anecdotal notes during the Fishing Game and High Rises in Number Ville.

Re-teaching and Extension:

For those who have not completely understood the lesson:

- Use bundles of drinking straws to model 2-digit numbers.
- Show the addition sign and re-emphasize that it means MORE.
- Place two sets of numbers vertically and horizontally for students to add without regrouping e.g. **20 + 30**.
- Use the bundled straws to show the two sets of numbers
- Check to ensure that all the students understand that there are 50 straws.

For those who have understood the lesson and are ready to move on to the next level, encourage them to:

- Write and add 2-digit numbers without regrouping.
- Pair index cards with 2-digit numbers (e.g. 42 + 12) and add.
- Have each student work with a partner to write and solve problems.

Lesson 2
Pre-Assessment

- Have students say how many tens and ones are in the sum of the following numbers: **7+5** (**12:** one ten, two ones), **9+7** (**16:** one ten, six ones), **8+6** (**14:** one ten, four ones).
- Supervise students as they add numbers without regrouping with partners using index cards with numbers. Assign two sets of index cards to each student in pairs. Allow them to pair numbers with their partners to add. For example if Don has number 22, he will get number 34 from Donna and add both numbers. They will continue until all numbers in each person's set of numbers have been added. Direct students to record their numbers in the correct column-tens and ones on the place value mats (Student Resource2).
- Check for correct and incorrect answers.
- Assess students' progress by observing there work and offer assistance as needed.

Launch

- Read and discuss the poem: *Fifty-four Grandmas and a Llama* by Lynn Manuel.
- **Math Game: Name that Number!**
  - Assign students to groups of four.
  - Give each group a new set of index cards with these numbers: **46, 29, 64, 17, 9, 38, 44**, and **87**.
  - Ask each group to take turns identifying the numbers, and say the value of each number in the one or two-digit numbers, e.g. 44 will be four tens and four ones.
  - Assess to ensure that students understand that each number in the 2-digit number has a different value.

Teacher Facilitation

- Ask students to use their base ten blocks to show these numbers on their place value mats (Student Resource 2). **44+17.**
- Show the same on the overhead place value mat.
- Guide students through the addition steps, reemphasizing that they must always add the numbers on the ones column first.
- Ask the following questions:
  1. How many ones do we have when we add 7 and 4? (11)
  2. Do we have more than ten ones? (YES)
  3. What do we do with the 11 ones? (Regroup them to make one ten and one 1).
  4. Where should the one ten go? (We should move it to the tens column.)
  5. Now, how many tens do we have on the tens column? (We now have 6 tens.)
  6. What is the answer to the problem **44+17**? (The answer is **61** or 6 tens and 1 one.)
- Guide students to solve two sets of problems, 38 + 14, and 55 + 28 using the same steps as shown above. Remind students to add the one ten that was regrouped from the ones column.
- Check for understanding and guide students through more examples if needed, until they are able to solve the problems on their own.
- Assess students' progress by observing their work and offer assistance if needed.

Student Application

- Have students complete the Tens and Ones Problems (Student Resource 4) using the steps for regrouping. First, model each number on the place value mat. Combine the ones. If the ones are more than nine, then regroup the ones to make a ten. Finally, combine the tens to find the sum. The answer key can be found on Teacher Resource 3.

Embedded Assessment

- Teacher observation of students during Name that Number! game and Student Application.

Re-teaching/Extension

For those who have not completely understood the lesson:

- Review the words ones, tens and regroup.
- Guide them through the processes of adding numbers in columns of tens and ones.
- Ask the following questions after you write these problems (one at a time) on their work sheets (or dry erase boards) **64 + 28; 73 + 22; 86 + 9; and 57 + 15.**
  1. When you model the number, how many ones do you have?
  2. Do you need to regroup? Why? Why not?
  3. How will you regroup?

  Allow time for students to solve the problem by regrouping the ones if necessary.

  4. How many tens and ones are on your place value mats?
  5. What is the sum of the two numbers (addends)?

For those who have understood the lesson and are ready to move on to the next level, encourage them to:

- Work from a stack of numbers and rewrite them to regroup. The stack may contain numbers as follows: **23, 75, 11, 68, 98, 22, 88, 56, 19 and 37**. They may pair the numbers up to add.

Lesson 3

Pre-Assessment

- Students will complete the following word problem using Student Resource 5 (a half sheet copied prior to this lesson). Answer key can be found on Teacher Resource 4.
  - *Max has 58 marbles. Judy gave him 13 more. How many marbles does Max have now?*
- Students can use any method to solve.
- Teacher observation during assessment will help to better implement the lesson.

Launch

Distribute "Break the Code to the Number Ville Treasure Chest" Student Resource 6 to each student.

- With a partner, students will solve the addition problems to break the code.
- Optional: The first three partner pairs to solve all the problems and break the code win a prize! (A sticker) Answer key is on Teacher Resource 5.

Teacher Facilitation

- Encourage students to use a variety of strategies to solve the problems. Introduce the following strategies:

Invented Strategies

Add Tens, Add Ones, Then Combine

Teacher model

56 + 28

- 50 and 20 are 70
- 6 and 8 are 14
- 70 and 14 are 84

56 + 28

50 + 20 = 70

6 + 8 = 14

84

OR

50 + 6

20 + 8

70 + 14 = 84

Practice with a partner

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**

25 + 54

- 20 and 50 are 70
- 5 and 4 are 9
- 70 and 9 are 79

On your own

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**

62 + 34

- 60 and 30 are 90
- 2 and 4 are 6
- 90 and 6 are 96

Use a Nice Number and Compensate

Teacher model

46 + 28

- 46 and 30 (giving 2 to the 28) are 76
- That's 2 extra, so it's 74 (76-2 =74)

46 + 28

46 + 30 = 76

+ 2 -2 = 74

Practice with a partner

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**

18 + 36

- 20 and 36 (giving 2 to the 18) are 56
- That's 2 extra, so it's 54 (56-2 = 54) +2

18 + 36

20 + 36 = 56

On your own

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**
  54 + 38
- 54 and 40 (giving 2 to the 38) are 94
- That's 2 extra so its 92 (94 – 2 = 92)

Traditional Algorithm:

Teacher model

23 + 29

- Add the ones—3+9=12
- Leave the 2 below in the one's column and regroup the one to the tens column.
- Add the tens column 2+2+1=5
- 52 is the answer

```
  1
 23
+29
 52
```

Practice with a partner

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**
  35 + 19
- Add the ones—9+5=14
- Leave the 4 below in the one's column and regroup the one to the tens column.
- Add the tens column—1+3+1=5
- The answer is 54

```
  1
 35
+19
 54
```

On your own

- **Monitor student progress**
- **Explain the bulleted part (below) after students arrive at a solution.**
  73 + 17
- Add the ones—3+7=10
- Leave the 0 below in the one's column and regroup the one to the tens column.
- Add the tens column—1+7+1=9
- The answer is 90

```
    1
 73
+17
 90
```

Student Application

- Copy Student Resource 7 prior to lesson. Answer key is on Teacher Resource 6.
- Allow students to work independently so solve the problems using any of the algorithms learned today or any new strategies they may have already.
- Monitor student progress during this time on an individual basis. A small group pull out or whole class intervention could correct any misconceptions.

Embedded Assessment

- Pre-assessment
- Teacher Observations

Re-teaching/Extension

- For those who have not completely understood the lesson, review what is needed.
  - Using the independent Student Resource 7, re-teach the strategy that is needed.
- For those who have understood the lesson, take them to the next step in development of the concept.
  - Allow students to quietly work in partners on Student Resource 8. Answer key is on Teacher Resource 7.

Summative Assessment:

- Have students complete the Summative Assessment, Student Resource 9, at the conclusion of this lesson.

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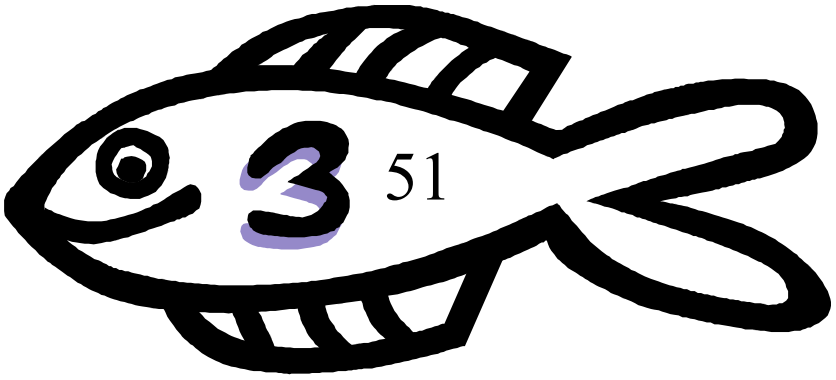

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65

3
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3
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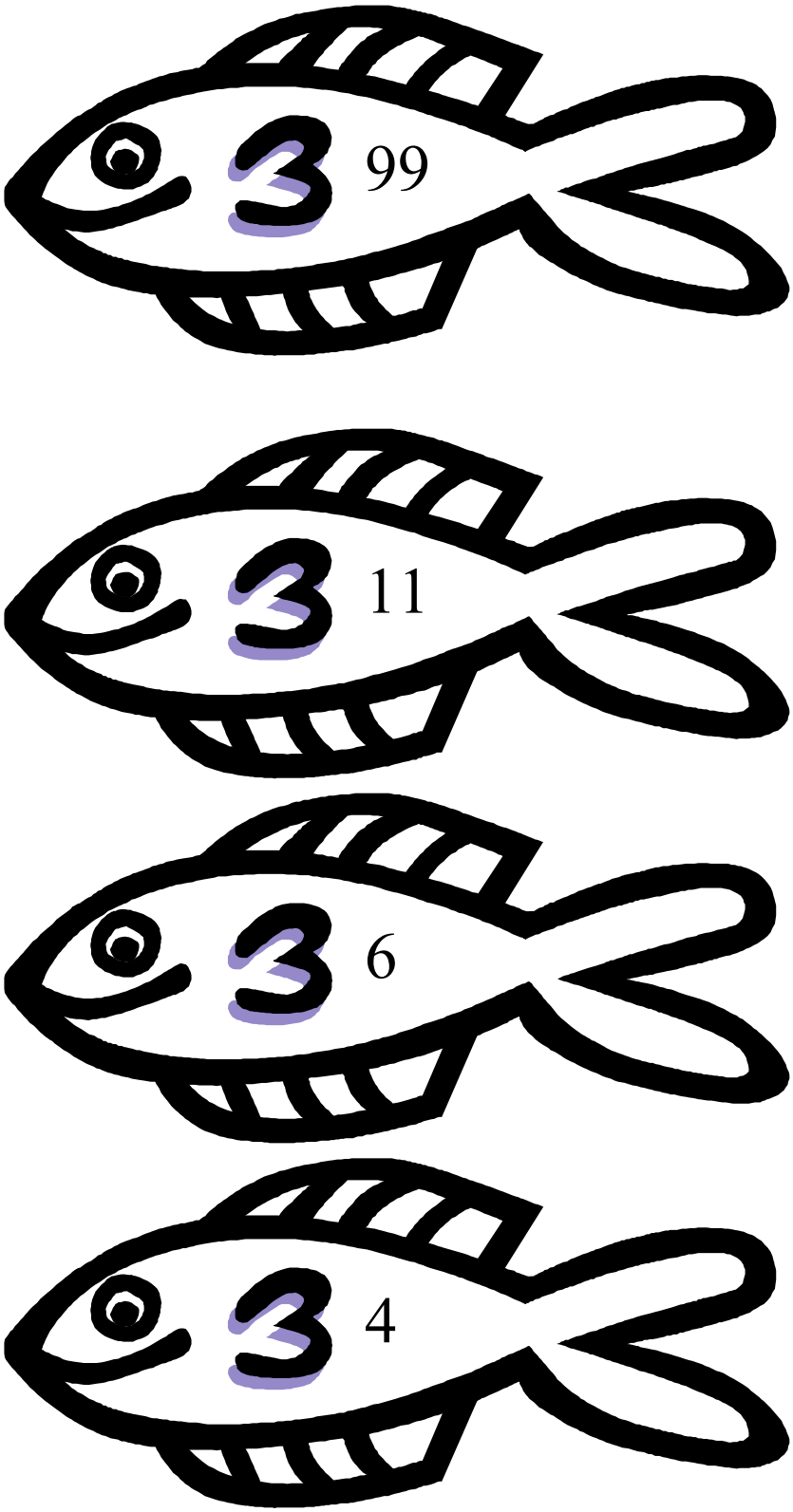
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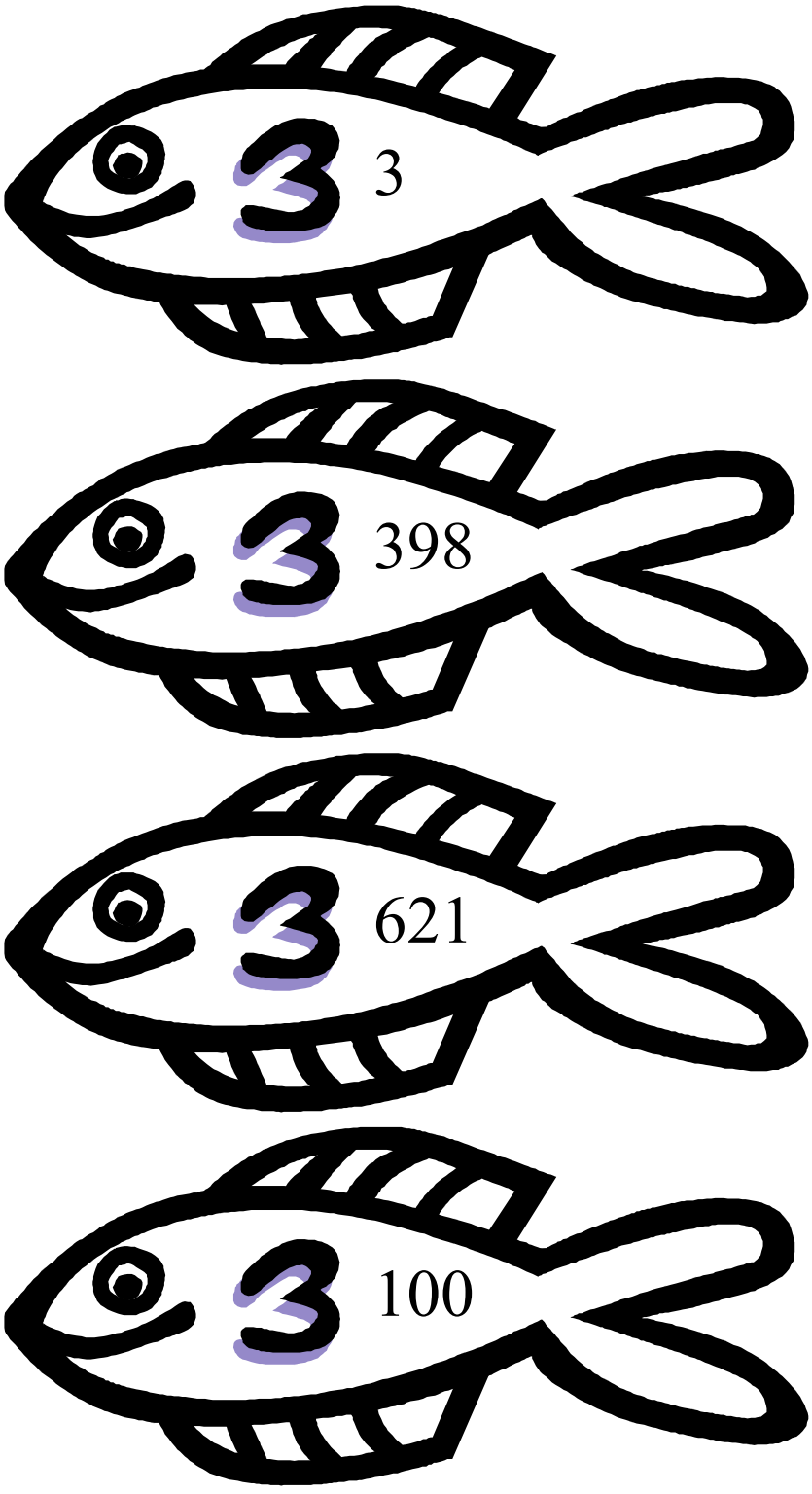
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3
398
3
621
3
100

Name: _____ Date: _____

Answers

High Rises in Number Ville

Directions: Solve.

1.

	T	**O**
	3	3
+	2	2
	5	5

2.

	T	**O**
	8	5
+	1	4
	9	9

3.

	T	**O**
	6	3
+	2	6
	8	9

Directions: Draw the place value lines for the following problems and then solve.

4. $\begin{array}{r} 73 \\ +\ 26 \\ \hline 99 \end{array}$

5. $\begin{array}{r} 12 \\ +\ 25 \\ \hline 37 \end{array}$

6. $\begin{array}{r} 44 \\ +\ 52 \\ \hline 96 \end{array}$

Tens	Ones

Name: _____ Date: _____

Tens and Ones Problems

Directions: Draw each addend in the correct column and add. Record the sum under the correct problem.

Tens	Ones
| | |	..
+ | |	·····
| | | | | |	•

1. 32
+ 29
61

Tens	Ones
|	·····
+|	·····
| | |	·····

2. 17
+ 19
36

Tens	Ones
| | |	·····
+| | | |	·····
| | | | | | | |	•

3. 35
+46
81

Name: _____ Date: _____

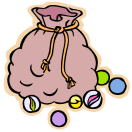
Pre-Assessment

Directions: Solve. Show your work.

Max has 58 marbles. Judy gave him 13 more. How many marbles does Max have now?

58
+13
71

Name: _____ Date: _____



Pre-Assessment

Directions: Solve. Show your work.

Max has 58 marbles. Judy gave him 13 more. How many marbles does Max have now?

58
+13
71

Name: _____ Date: _____

Break the Code to the Number Ville Treasure Chest!

Directions:

- Solve each problem.
- Match the sum to the letter.
- Break the code!

1. 31 + 1 = R 32

2. 25 + 43 = S 68

3. 10 + 63 = O 73

4. 29 + 11 = Y 40

5. 65 + 34 = A 99

6. 15 + 83 = T 98

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
99	12	36	5	52	45	6	87	14	3	9	39	77	18	**73**	10	97	**32**	**68**	**98**	2	22	23	95	**40**	0

Y	O	U		A	R	E		S	M	A	R	T	
___	___	___		___	___	___		___	___	___	___	___	!
40	73	2		99	32	52		68	77	99	32	98	

Name: _____ Date: _____

Directions: Solve using any strategy. Show your work!

1. 65
   +15
   80

2. 75
   +23
   98

3. 32
   +26
   58

4. 14
   +57
   71

5. 26
   +49
   75

6. 55
   +39
   94

7. 79
   +15
   94

8. 71
   +19
   90

Name: _____ Date: _____

Extend

Directions: Solve. Show your work!

1. 85
   +19
   104

2. Jamie has 36 crayons. Ted has 77 crayons. How many do they have all together?
   36
   +77
   113

3. Create 2 problems like we have done in class for your partner to solve on the back of this page.

Name: _____ Date: _____

1. 12
   +19

   a. 21
   b. 20
   c. <u>31</u>
   d. 211

2. 25
   +35

   a. 50
   b. <u>60</u>
   c. 510
   d. 51

3. 46
   +44

   a. <u>90</u>
   b. 810
   c. 70
   d. 89

4. 65
   +28

   a. 83
   b. 73
   c. 813
   d. <u>93</u>

Summative Assessment

Name: _____ Date: _____

Part A:

Find the sum.

$$\begin{array}{r} 16 \\ +18 \\ \hline \mathbf{34} \end{array}$$

Part B:

Explain how you know your answer is correct.
Use what you know about addition in your explanation.
Use words, numbers and/or symbols in your answer.

Sample Responses:

A.
10 +10 =20
6 + 8 =14
20+ 14 =34

B.
18 + 2 more is 20
20+16 is 36
36 -2 = 34

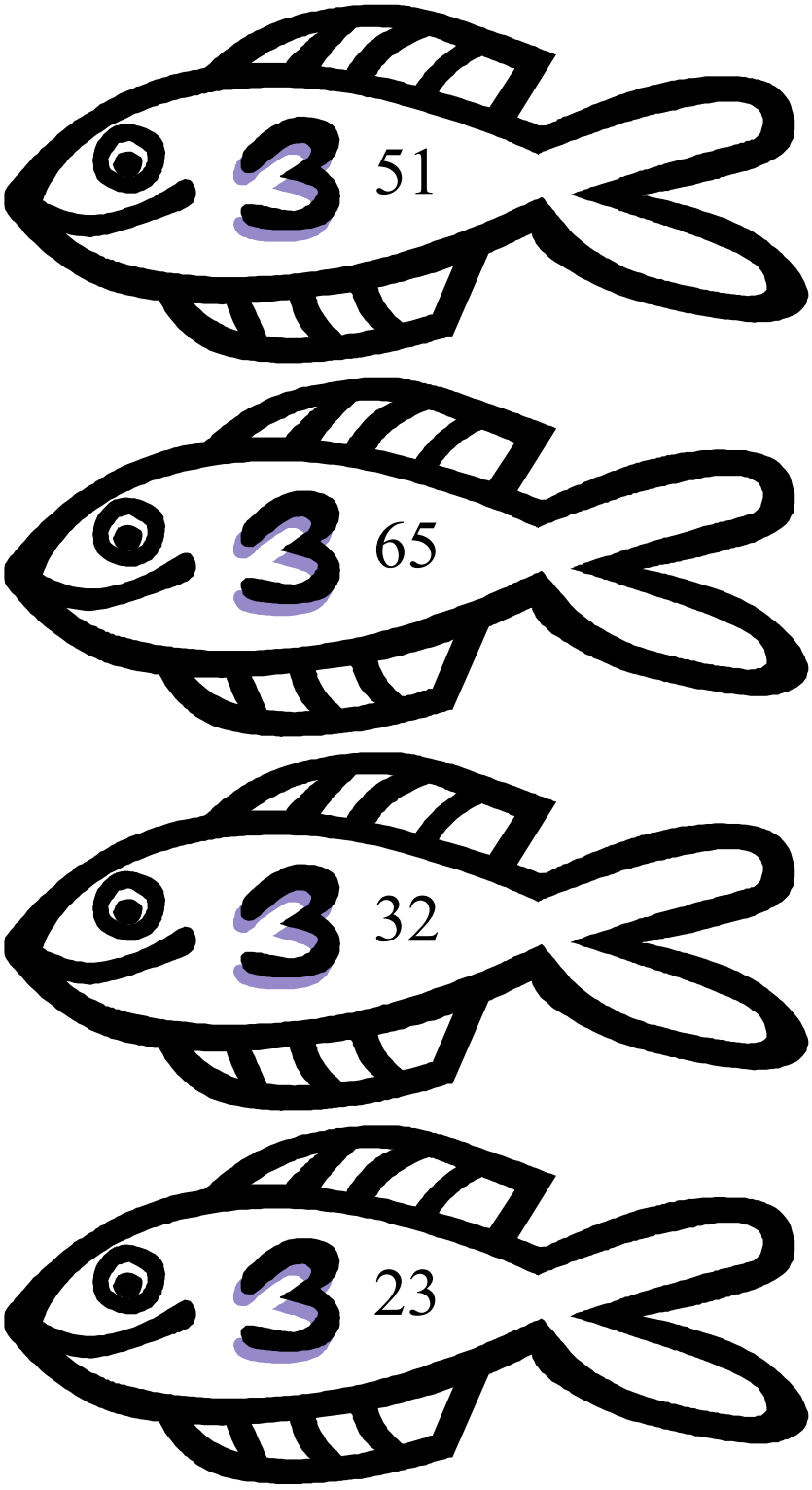
C.

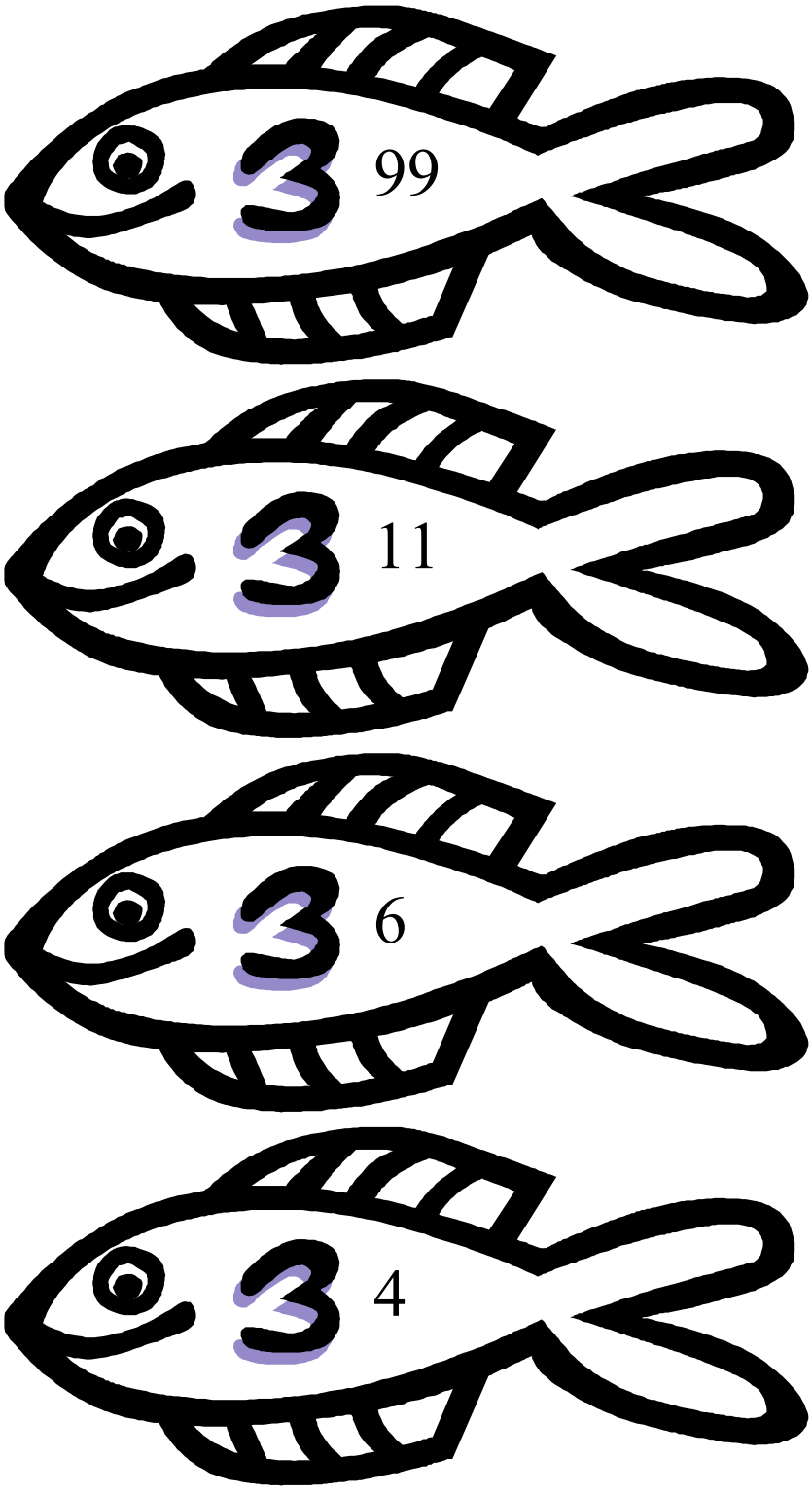
- **Add the ones place 6+8 =14**
- **The four stays in the ones column and regroup the one to the tens column.**
- **1 +1 +1 =3**
- **So the answer is 34—3 tens and 4 ones**

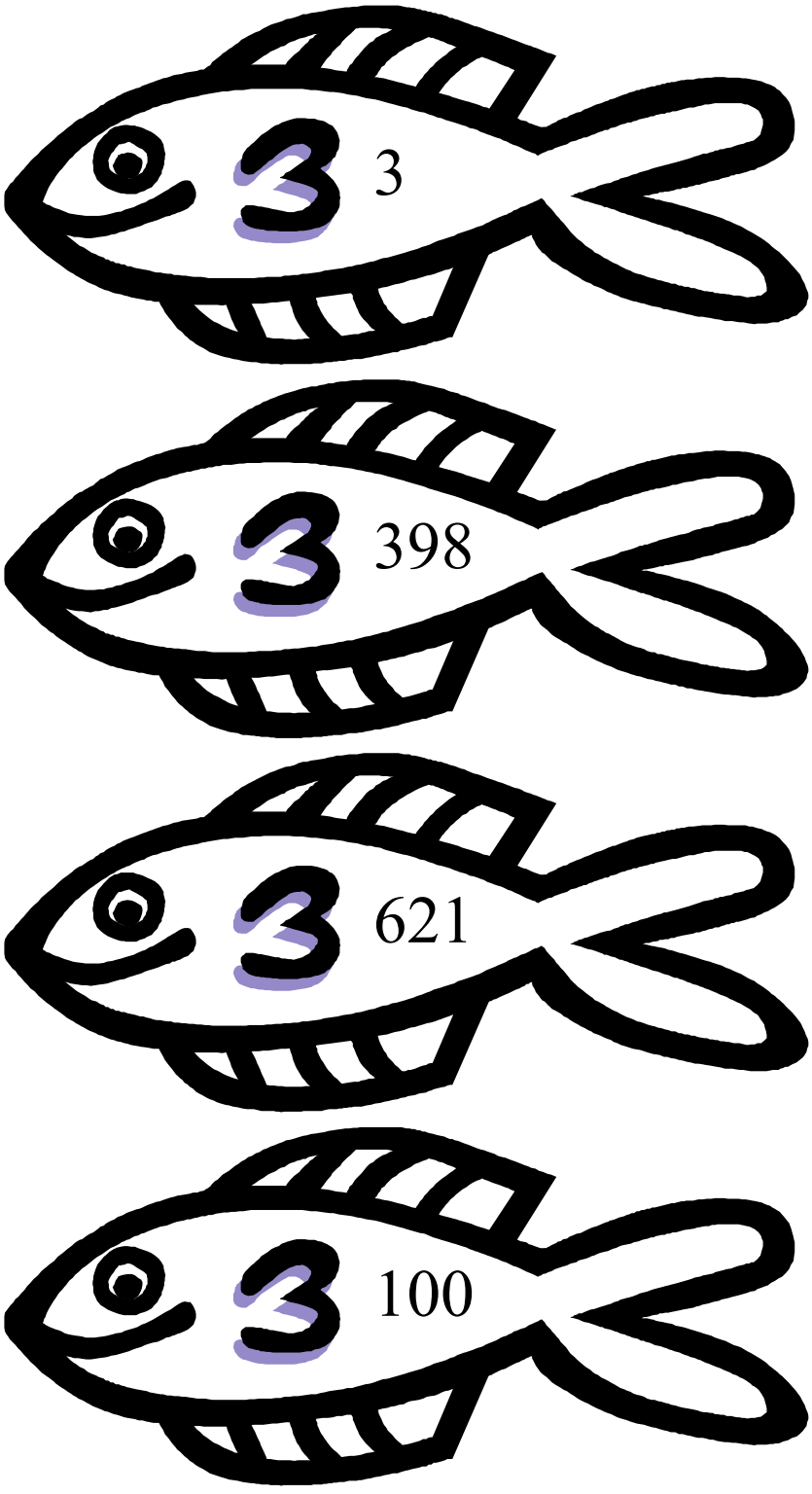
Hundred Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Student Resource 2




3 99
3 11
3 6
3 4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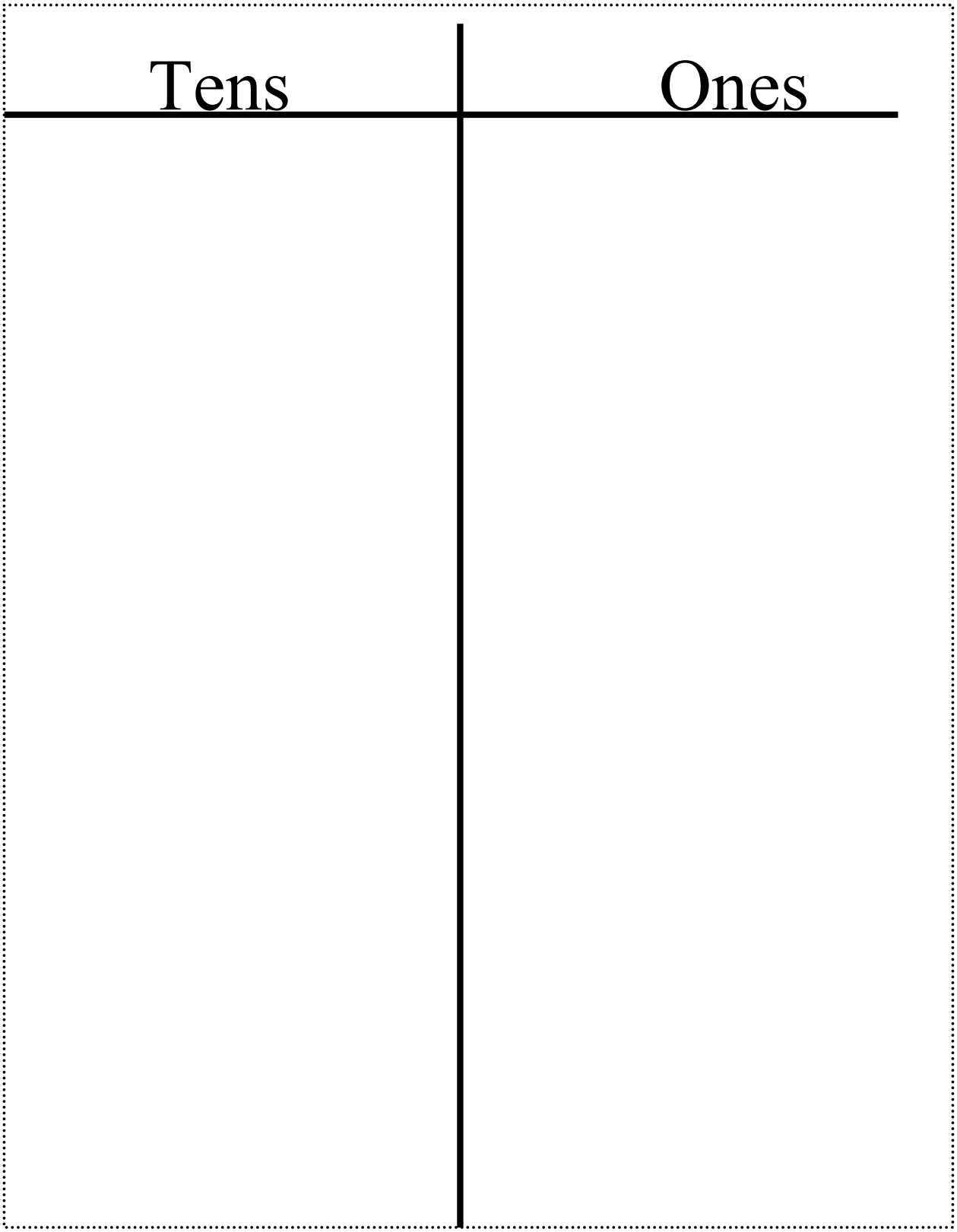
100

Student Resource 2

Place Value Mat



Name: _____ Date: _____

High Rises in Number Ville

Directions: Solve.

1.

	T	**O**
	3	3
+	2	2

2.

	T	**O**
	8	5
+	1	4

3.

	T	**O**
	6	3
+	2	6

Directions: Draw the place value lines for the following problems and then solve.

4. 7 3
+ 2 6

5. 1 2
+ 2 5

6. 4 4
+ 5 2

Name: _____ Date: _____

Tens and Ones Problems

Directions: Draw each addend in the correct column and add. Record the sum under the correct problem.

Tens	Ones
+	

1. 32
+ 29

Tens	Ones
+	

2. 17
+ 19

Tens	Ones
+	

3. 35
+46

Student Resource 5

Name: _____ Date: _____

Pre-Assessment

Directions: Solve. Show your work.

Max has 58 marbles. Judy gave him 13 more. How many marbles does Max have now?

Name: _____ Date: _____

Pre-Assessment

Directions: Solve. Show your work.

Max has 58 marbles. Judy gave him 13 more. How many marbles does Max have now?

Name: _____ Date: _____

Break the Code to the Number Ville Treasure Chest!

Directions:

- Solve each problem.
- Match the sum to the letter.
- Break the code!

1. 31 + 1 = R

2. 25 + 43 = S

3. 10 + 63 = O

4. 29 + 11 = Y

5. 65 + 34 = A

6. 15 + 83 = T

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
__	12	36	5	52	45	6	87	14	3	9	39	77	18	__	10	97	__	__	__	2	22	23	95	__	0

___	___	___	___	___	___	___	___	___	___	___
40	73	2	99	32	52	68	77	99	32	98

!

Name: _____ Date: _____

Directions: Solve using any strategy. Show your work!

1. 65
   +15

2. 75
   +23

3. 32
   +26

4. 14
   +57

5. 26
   +49

7. 55
   +39

8. 79
   +15

9. 91
   +19

Name: _____ Date: _____

Extend

Directions: Solve. Show your work!

1. 85
   +19

2. Jamie has 36 crayons. Ted has 77 crayons. How many do they have all together?

3. Create a few problems for your partner to solve on the back of this page.

Name: _____ Date: _____

1. 12
+19

a. 21
b. 20
c. 31
d. 211

2. 25
+35

a. 50
b. 60
c. 510
e. 51

3. 46
+44

a. 90
b. 810
c. 70
f. 89

4. 65
+28

a. 83
b. 73
c. 713
d. 93

Summative Assessment

Name: _____ Date: _____

Part A:
Find the sum.

$$\begin{array}{r} 16 \\ +18 \\ \hline \end{array}$$

Part B:
Explain how you know your answer is correct.
Use what you know about addition in your explanation.
Use words, numbers and/or symbols in your answer.

_____

_____

_____

_____

_____